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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,629	09/12/2003	Tsuyoshi Kaneko	116899	6810

25944 7590 09/19/2006

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EXAMINER
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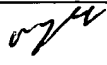
VAN ROY, TOD THOMAS

ART UNIT	PAPER NUMBER
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2828

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/660,629	<b>Applicant(s)</b> KANEKO ET AL.	
	<b>Examiner</b> Tod T. Van Roy 	<b>Art Unit</b> 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 July 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 11, 12, 14-16 and 19-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11, 12, 14-16, 19-26 and 30-32 is/are rejected.
- 7) ☒ Claim(s) 27-29 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

The examiner acknowledges the amending of claims 1, 14, and 22.

### ***Response to Arguments***

The examiner notes the previous final rejection (paper no. 08302006) is hereby withdrawn and replaced by the current office action. The previous final rejection failed to address new claims which had been submitted by the applicant.

Applicant's arguments filed 07/14/2006 have been fully considered but they are not persuasive.

With respect to claims 1, 14, and 22, the applicant states that the claim amendments reading: "...the optical member having a maximum cross section and a lower surface, the maximum cross section being parallel with the lower surface, the lower surface being in contact with the upper surface of the base member, the maximum cross section being at a distance from the upper surface of the base member, a width of the maximum cross section being larger than a width of the lower surface..." overcomes the rejections in view of Kondo and Cox. The applicant has stated (pg.9 para.2 of the Remarks) that "Thus the width of the maximum cross section equals the width of the lower surface."

The examiner does not agree that the current amendment distinguishes the instant invention from that of Kondo. Namely, Kondo teaches a portion of the optical

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element to be in contact with the base (fig.1 #105). This portion can be considered the lower surface of the optical member. The optical member further has a maximum cross section that is parallel to, and located at a distance from the defined lower surface (just above layer #113). Thus, the lower surface has a width that is smaller than the width of the maximum cross section, and the claim limitation has been met.

The examiner does agree that the current amendment is distinct from that of the cited Cox reference. The rejection of claim 1 by Cox is therefor withdrawn.

Please see below for an update rejection to these claims.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 14-16, 22-26, and 30-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Kondo (JPO 2001-284725).

With respect to claim 1, Kondo discloses a surface emitting device, emitting light in a direction perpendicular to a substrate, comprising: an emitting surface that emits light (fig.1 top of #104), a base member that is provided on the emitting surface (fig.1 #105, emitting surface defined as output of upper mirror layers), and an optical member provided on the base member (fig.1 #111), the optical member having a maximum cross section and a lower surface, the maximum cross section being parallel with the

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lower surface, the lower surface being in contact with the upper surface of the base member, the maximum cross section being at a distance from the upper surface of the base member, a width of the maximum cross section being larger than a width of the lower surface (please see arguments above), the surface emitting light device being a surface emitting semiconductor laser (title), the substrate being a semiconductor substrate (fig.1 #101), a resonator having a pillar portion (fig.1 #'s 103, 104), an emitting surface provided on a top surface of the pillar portion, and a diameter of a bottom surface the base member being smaller than a diameter of the top surface of the pillar portion (fig.1 diameter of bottom of base, #105, smaller than the diameter of the top of pillar, #103 + 104, due to the tapered, mesa [0047], shape).

With respect to claim 2, Kondo discloses the surface emitting device as outlined in the rejection of claim 1, and further discloses the base member to be of a material that transmits light of a predetermined wavelength ([0032], AlGaAs, wavelength transmission based on energy gap).

With respect to claim 3, Kondo discloses the surface emitting device as outlined in the rejection of claim 1, and further discloses the optical member to function as a lens (fig.1 #111, [0007]).

With respect to claim 14, Kondo discloses the surface emitting device as outlined in the rejection to claim 1, including the inclusion of an active layer in the pillar portion (fig.1 #103).

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With respect to claim 15, Kondo discloses the surface emitting device as outlined in the rejection of claim 10, and further discloses the base member to be formed integrally with the pillar portion (fig.1 #105 formed integrally with pillar #103 + 104).

With respect to claim 16, Kondo discloses the surface emitting device as outlined in the rejection of claim 15, and further discloses the base member to consist of a semiconductor layer (AlGaAs).

With respect to claim 22, Kondo discloses a method of manufacturing a surface emitting device comprising: forming a part that has an emitting surface and functions as the light emitting element ([0044]), forming a base member on the substrate ([0044]), discharging a droplet onto an upper surface of the base member to form an optical member precursor ([0057]), hardening the optical member precursor to form the optical member ([0061]), the surface emitting light device being a surface emitting semiconductor laser (title), the substrate being a semiconductor substrate (fig.1 #101), the optical member having a maximum cross section and a lower surface, the maximum cross section being parallel with the lower surface, the lower surface being in contact with the upper surface of the base member, the maximum cross section being at a distance from the upper surface of the base member, a width of the maximum cross section being larger than a width of the lower surface (please see arguments above), a resonator having a pillar portion (fig.1 #'s 103, 104), an emitting surface provided on a top surface of the pillar portion, and a diameter of a bottom surface of the base member being smaller than a diameter of the top surface of the pillar portion (fig.1 diameter of

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bottom of base, #105, smaller than the diameter of the top of pillar, #103 + 104, due to the tapered, mesa [0047], shape).

With respect to claim 23, Kondo discloses the surface emitting device as outlined in the rejection of claim 22, and further discloses discharging the droplet using an inkjet method ([0071]).

With respect to claim 24, Kondo discloses the surface emitting device as outlined in the rejection of claim 22, and further discloses adjusting the wettability of the upper surface of the base member with respect to the droplet before discharging the droplet ([0059], speaking of choosing the material type to assist in the application droplet placement and retention).

With respect to claims 25-26, Kondo discloses the optical member to be formed over an entire top surface of the base member (fig.1, #111 formed over all of top exposed surface #105, as well as completely over the portion of #105 covered by #113).

With respect to claims 30-32, Kondo discloses the height of the base member to be shorter than a height of the optical member (#105 shown as shorter than #111).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Yoshikawa et al. (US 6154479).

With respect to claim 4, Kondo teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the optical element to be a polarizer. Yoshikawa teaches a vertical cavity laser including the importance of controlling the polarization of the output light (col.2 lines 27-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo with the polarizing optical element of Yoshikawa in order to avoid instabilities when used in an optical system (Yoshikawa, col.2 lines 31-36).

Claims 5, 7-8, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Kakimoto (JPO 63-007674).

With respect to claim 5, Kondo teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the optical member to be in the form of a sphere or an oval sphere. Kakimoto teaches a surface emitting device utilizing an optical member with a spherical shape (fig.1 #9). It would have been obvious to one of



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ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo with the spherical lens of Kakimoto since these lens are well known in the art to be used for the focusing of light over short distances, i.e. from device output surface to fiber, and are readily available for purchase and use.

With respect to claims 7 and 8, Kondo teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the upper surface of the base member to be curved, and that an angle made between the upper surface of the base member and a side surface of the base member to be an acute angle. Kakimoto teaches a surface emitting device utilizing a curved member (fig.1 #10) whose top surface forms an acute angle with the side surface (fig.1 #10, top surface vs. side surface angle). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo with the curved surface of Kakimoto in order to provide for a more secure support, which can aid in preventing the lens from being misaligned during usage.

With respect to claim 11, Kondo teaches the surface emitting device as outlined in the rejection of claim 1, and further teaches the substrate to be a semiconductor (fig.1 #101), and a resonator to be formed on the substrate (formed between mirrors #104 and #102). Kondo does not teach the emitting surface to be on a reverse side of the substrate. Kakimoto teaches a surface emitting device wherein the emitting surface is on the reverse side of the substrate (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting

device of Kondo with the emission direction of Kakimoto to allow for the common practice of flip-chip bonding, without interfering the optical output.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Kondo (JPO 2000-076682).

With respect to claim 6, Kondo '766 teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach a sealing member to be formed to cover part of the optical member. Kondo '682 teaches a surface emitting device that uses a sealing member to cover a part of the optical member (fig.1 #106, electrode functioning to seal lower portion of optical member #102). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo '766 with the optical sealing portion of Kondo '682 in order to provide for a more secure support which can aid in preventing the lens from being misaligned during usage.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Kakimoto and further in view of Nakamura et al. (US 4706101).

With respect to claim 12, Kondo '766 teaches the surface emitting device as outlined in the rejection of claim 9, and further teaches the substrate to be a semiconductor substrate (fig.1 #101), and a resonator to be formed on the substrate (formed by mirrors #104 and #102). Kondo '766 does not teach the device to include a concave part being formed in the rear surface of the substrate, or a light path adjusting

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layer to be buried in the concave part having the emitting surface on the upper surface thereof. Nakamura teaches a surface emitting device in which the a concave part is formed on the rear surface of the substrate (fig.1 #21), and Kakimoto teaches a surface emitting device including a cylindrical part is formed on the rear surface of the substrate wherein a light path adjusting layer is buried therein (fig.1 #11). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo '766 with the concave surface of Nakamura, to increase the amount of light striking the surface with an incident angle greater than the critical angle (better out-coupling the light), as well as the buried light path adjusting layer of Kakimoto, to further increase optical light confinement for out-coupling, in order to allow for the common practice of flip-chip bonding without interfering with the optical output.

Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo '766 in view of Aoyama (JPO 06-151972).

With respect to claim 19, Kondo '766 teaches the surface emitting device as outlined in the rejection of claim 1, and further teaches the optical member to function as a lens, and being in the form of a truncated sphere (fig.1 #111). Kondo '766 does not teach the refractive index of the optical member to be approximately equal to the base member or the radius of curvature to be less than or equal to .34 times the distance from the emitting surface to the top of the optical member. Aoyama teaches a surface emitting device including the optical member having a refractive index being the same

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as the base ([0026]), and that the radius of curvature to be less than or equal to .34 times the distance from the emitting surface to the top of the optical member ([0026], fig.3, teaches  $d=2*\text{radius of curvature}$ , then  $d$  from the claim is  $d_{\text{claim}}=(w+d/2)$ , since the lens in fig.3 is one half sphere (note 90 degree mark), and the claim relationship becomes  $.34*(w+d/2) \geq d/2$ , wherein if  $w=10$  then  $d = 10.3$ , see fig.4). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo '766 with the index and curvature relationship of Aoyama in order to improve the joint effectiveness ratio of the device relative to other optical components (Aoyama, fig.4).

With respect to claims 20-21, Kondo '766 teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the inclusion of an optical waveguide, or an optical transmission apparatus. Aoyama teaches a surface emitting device including its use with an optical waveguide (fiber optic cable) and optical transmission apparatus (photoelectrical detection equipment) ([0040]). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo '766 with the waveguide and transmission apparatus of Aoyama as it is well known in the art to use optical fiber in transmission systems to transmit communication or other data.

***Allowable Subject Matter***

Claims 27-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 27-29 are believed to be allowable as a surface emitting device, or method of manufacturing a surface emitting device, having the stated dimensions of the base layer relative to the other device features, as well as being formed of resin was not found to be taught in the prior art. Kondo was found to disclose all of the elements of the base claims, including the use of resin (fig.1 #106), but did not teach the resin to be used as the base member. A Japanese document (2002-331532, applicant submitted prior art) was found to teach a resin applied to a surface emitting device prior to the addition of a microlens to increase the control of the lens positioning. The Kondo reference makes use of the resin for the same reasons, but in a different manner. Although it may be argued that combining the 2002-331532 method with that of Kondo would eliminate the need for the larger resin layer, and reduce the overall lens size, motivation does not exist for the new resin layer to take on the specific base layer dimensions specified in the claims. If the new resin were to be applied between the electrode portions (#103), the height of the resin layer would need to be below that of the electrode in order to meet the 'width of the maximum cross section being larger than a width of the lower surface' limitation, but motivation for this height does not exist. As has

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been laid out above, the method of applying a resin before the lens application is known, as well as the overall device structure, however motivation was not found to have the resin take the shape of the base member as outlined in the claim limitations.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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